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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/964,375	09/28/2001	Jong-Seo Choi	P56533	2237
7590		07/23/2004	EXAMINER	
Robert E. Bushnell		QUARTERMAN, KEVIN J		
Suite 300		ART UNIT		
1522 K Street, N.W.		PAPER NUMBER		
Washington, DC 20005		2879		

DATE MAILED: 07/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/964,375

Applicant(s)

CHOI ET AL.

Examiner

Kevin Quarterman

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7, 10, 12, 16, 17, 20-22, 29 and 36-78 is/are pending in the application.
- 4a) Of the above claim(s) 36-47 and 78 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7, 29 and 57-67 is/are allowed.
- 6) ☒ Claim(s) 10, 16, 20-22, 48-53, 55, 56, 68-70, 72-74, 76 and 77 is/are rejected.
- 7) ☒ Claim(s) 12, 17, 54, 71 and 75 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>0404</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on 26 February 2004 has been entered.

Election/Restrictions

2. Applicant's traversal of the restriction requirement imposed in the previous office action is acknowledged. The traversal is on the ground(s) that the restriction requirement is being imposed for administrative convenience. This is not found persuasive because the Examiner presented evidence establishing undue burden in search and examination of all of the claims in the application. The Examiner further notes that the non-elected invention (now claims 36-47 and 78) appears to be reasonably analogous to arts of manufacturing processes, such as printing, electro-deposition, and roll coating. Accordingly, a reasonable field of search for the non-elected invention is likely to include a search in arts of manufacturing processes (in accordance with MPEP § 904.01(c)), which would not be required for examination of the elected invention.
3. In summary, the Examiner has shown the inventions to be related, but patentably distinct, and the undue burden to the Examiner has been shown by the different searches required for each invention. Thus, the requirement is still deemed proper and is therefore made FINAL.

Claim Objections

4. Claims 36, 39-41, and 47 are objected to because it appears to the Examiner that each claim should be dependent upon independent claim 78, instead of claim 75,

since each claim is directed to a method of preparing a cathode. Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 48-50 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. Claim 48 recites the limitation "said layer" in line 6 of the claim. There is insufficient antecedent basis for this limitation in the claim. It is unclear to the Examiner whether applicant is referring to the base, the means for emitting electrons, or the means exhibiting the specific resistance cited in the claim. Due to their dependency upon independent claim 48, claims 49-50 are also deemed indefinite.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 10, 16, 51, 53, 55, 68, 70, 72, 74, and 76 are rejected under 35 U.S.C. 102(b) as being anticipated by Koizumi (US 5216320).

Art Unit: 2879

10. Regarding independent claim 10, Figure 1 of Koizumi shows a cathode for an electron tube comprising a metal base (2) and an electron-emitting material layer (3) coated on the metal base, the electron-emitting material layer comprising a needle-shaped conductive material (col. 2, ln. 63) and having a surface roughness corresponding to a distance between a highest part point and a lowest point on a surface of the electron-emitting material layer being less than 10 microns. Since the electron-emitting material layer is shown having a flat, smooth surface, the Examiner notes that the layer has a surface roughness of zero microns, which is less than 10 microns.

11. Regarding claim 16, Figure 1 of Koizumi shows an oxide cathode for an electron tube comprising a metal base (2) and an electron-emitting material layer (3) uniformly coated on the metal base, the electron-emitting material comprising a needle-shaped conductive material (col. 2, ln. 63), the needle-shaped conductive material in the electron-emitting material layer being in a range of 0.01 to 30% by weight based on a total weight of the electron-emitting material (col. 2, ln. 52-60).

12. Regarding newly added independent claim 51, Figure 1 of Koizumi shows a cathode comprising a metal base (2); a layer of an electron-emitting material (3) disposed upon the base; and a needle-shaped electrically conductive material (col. 2, ln. 63) providing electrically conductive paths disposed throughout the layer of electron-emitting material.

13. Regarding claim 53, Koizumi discloses the conductive material comprising 0.01% by weight to 30% by weight of the layer (col. 2, ln. 52-60).

14. Regarding claim 55, Figure 1 of Koizumi shows the layer exhibiting a surface roughness of less than 10 microns, as discussed earlier for independent claim 10.
15. Regarding independent claim 68, Figure 1 of Koizumi shows a cathode comprising a metal base (2); a layer (3) of an electron-emitting barium-based alkali-earth metal carbonate material disposed upon the base; and a needle-shaped electrically conductive material (col. 2, ln. 63) providing electrically conductive paths in the layer of electron-emitting material.
16. Regarding claim 70, Koizumi discloses the conductive material comprising 0.01% by weight to 30% by weight of the layer (col. 2, ln. 52-60).
17. Regarding independent claim 72, Figure 1 of Koizumi shows a cathode comprising a metal base (2); and a layer (3) formed on the base from a carbonate paste comprised of a barium-based carbonate electron-emitter and needle-shaped electrically conductive powder (Abstract).
18. Regarding claim 74, Koizumi discloses the conductive material comprising 0.01% by weight to 30% by weight of the layer (col. 2, ln. 52-60).
19. Regarding claim 76, Figure 1 of Koizumi shows the layer exhibiting a surface roughness of being less than 10 microns.

Claim Rejections - 35 USC § 103

20. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2879

21. Claims 20-22, 52, 56, 69, 73, and 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koizumi (US 5216320) in view of Saito (US 6124666).

22. Regarding claim 20, Koizumi discloses the limitations of independent claim 10, as discussed earlier, but fails to exemplify a metal layer including nickel grains having sizes smaller than the grains in the metal base.

23. Figure 1 of Saito teaches that it is known in the art to provide cathodes for an electron tube with a metal layer (4) including nickel grains having sizes smaller than the grains in the metal base layer (1), the metal layer formed between the metal base and the electron-emitting material layer (5). Saito discloses that this arrangement is provided for improving the life characteristics of the cathode (Abstract).

24. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the cathode structure of Koizumi with the metal layer formed between the metal base and the electron-emitting material layer, as taught by Saito, for improving the cathode structure.

25. Regarding claim 21, Saito discloses the metal layer including at least one metal selected from the group consisting essentially of aluminum, tungsten, tantalum, chromium, magnesium, silicon, and zirconium (Abstract).

26. Regarding claim 22, Saito discloses a thickness of the metal layer being in a range of 1 to 30 μ m (col.6, ln. 32-36).

27. Regarding claim 52, Saito discloses a metal layer exhibiting a grain size smaller than the base interposed between the base and the layer (Abstract).

28. Regarding claim 56, Saito discloses a thickness of the metal layer being in a range of 30 microns to 80 microns (col.6, ln. 32-36).
29. Regarding claim 69, Saito discloses a metal layer exhibiting a grain size smaller than the base interposed between the base and the layer (Abstract).
30. Regarding claim 73, Saito discloses a metal layer exhibiting a grain size smaller than the base interposed between the base and the layer (Abstract).
31. Regarding claim 77, Saito discloses a thickness of the metal layer being in a range of 30 microns to 80 microns (col.6, ln. 32-36).

Allowable Subject Matter

32. Claims 7, 29, and 57-67 are allowed.
33. Claims 48-50 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.
34. Claims 12, 17, 54, 71, and 75 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
35. The following are statements of reasons for the indication of allowable subject matter:
36. Regarding claims 7, 17, and 29, the prior art of record neither shows or suggests a cathode for an electron tube comprising an electron-emitting material layer comprising, in addition to other limitations of the base claims, a needle-shaped conductive material being a carbonaceous material, the needle-shaped conductive material being in a range of 0.01 to 30% by weight based on a total weight of the

Art Unit: 2879

electron-emitting material layer, and a thickness of the electron-emitting material layer being in a range of 30 to 80 μ m.

37. Regarding claim 12, the prior art of record neither shows or suggests a cathode comprising, in addition to other limitations of the claim, the needle-shaped conductive material selected from the group consisting essentially of indium tin oxide, nickel, magnesium, rhenium, molybdenum, and platinum.

38. Regarding claims 54, 71, and 75, the prior art of record neither shows or suggests a cathode comprising, in addition to other limitations of the claim, a conductive material comprising a specific resistance not greater than 10^{-1} Ω -cm.

39. Regarding independent claim 57, the prior art of record neither shows or suggests a cathode comprising, in addition to other limitations of the claim, a layer comprised of an electron-emitting material and a needle-shaped electrically conductive material exhibiting a specific resistance less the electron-emitting material disposed within the layer. Due to their dependency upon independent claim 57, claims 58-62 are also allowable.

40. Regarding independent claim 63, the prior art of record neither shows or suggests a cathode comprising, in addition to other limitations of the claim, a needle-shaped electrically conductive material exhibiting a specific resistance not greater than 10^{-1} Ω -cm. Due to their dependency upon claim 63, claims 64-67 are also allowable.

Response to Arguments

41. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Contact Information


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quarterman whose telephone number is (571) 272-2461. The examiner can normally be reached on M-TH (7-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kevin Quarterman
Examiner
Art Unit 2879

kq 
19 July 2004


Joseph Williams
Primary Examiner
Art Unit 2879